Linac08 Abstract

A FEMTOSECOND-LEVEL FIBER-OPTICS TIMING DISTRIBUTION SYSTEM USING FREQUENCY-OFFSET INTERFEROMETRY *

J. W. Staples, J. Byrd, L. Doolittle, G. Huang and R. Wilcox

A fiber-based frequency and timing distribution system based on the principle of heterodyne interferometry has been in development at LBNL for several years. The temporal fiber drift corrector has evolved from an RF-based to an optical base system, from mechanical correctors (piezo and optical trombone) to fully electronic, and the electronics from analog to fully digital, all using inexpensive commodity fiber components. Short term optical phase drift and long-term phase jitter are both in the femtosecond range over distribution paths of 2 km or more. The temperature dependence of group and phase velocity correction is measured and applied. We will discuss the results of field tests, integration into various client subsystems and further applications.

*This work was supported by the Director, Office of Science, Office of High Energy Physics, of the U.S. Department of Energy under Contract No. DE-AC02-05CH11231.